

Divisional of U.S. Serial No. 09/335,878
Preliminary Amendment filed April 26, 2001

REMARKS

Applicants have corrected obvious typographical errors in the specification. No new matter is involved with such corrections. Applicants have also amended Claim 14, the only independent claim, in order to clarify the present invention. It is believed that the application is now in condition for examination.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "**Version with markings to show changes made.**"

In the event that this paper is not timely filed, Applicant respectfully petitions for an appropriate extension of time. The fees for such an extension or any other fees which may be due with respect to this paper, may be charged to Deposit Account No. 01-2340.

Respectfully submitted,

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Enclosures: VERSION WITH MARKINGS TO SHOW CHANGES MADE

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IN THE SPECIFICATION:

Please amend the specification, as follows:

Replace the paragraph starting at Page 1, line 29, with the following rewritten paragraph:

--The solder balls are arranged on the ball pads of the TAB tape and thus function as external electrodes. As a result, the semiconductor chip and the solder balls are electrically connected to each other by the TAB tape as an interposer. In the case where a semiconductor device of surface mount type having solder balls functioning as external terminals, such as a semiconductor device of BGA or CSP type, is mounted to a motherboard, the semiconductor device is, in general, heated in a solder reflowing equipment having an [ambiente] ambient temperature of about 250°C to connect the melted solder balls to the electrode pads of the motherboard.--

Replace the paragraph beginning at page 2, line 11, with the following rewritten paragraph:

--In the semiconductor device in which the semiconductor chip is fixed on to the TAB tape by the die bonding material and sealed by the sealing resin, moisture is contained in the polyamide constituting the TAB tape, the sealing resin and the die bonding material. Especially, the polyamide making up the TAB type is a material which [is] easily absorbs moisture. Therefore, when the solder balls are reflowed to mount the semiconductor device to the motherboard, the moisture contained

in the TAB tape, the sealing resin and the die bonding material is evaporated with the increase in temperature and the vapor causes cracking and/or bulging of the semiconductor device.--

Replace the paragraph beginning at page 4, line 14, with the following rewritten paragraph:

--Preferably, the step of fixing the semiconductor chip to the tap tape by the adhesive resin layer includes the step of applying a die bonding material to the tape. As an alternative, the step of fixing the semiconductor chip to the tape by the adhesive resin layer includes the step of attaching a buffer material to the tape and the step of applying a die bonding material to the buffer material. As another alternative, the step of fixing the semiconductor chip to the tape by the adhesive resin layer includes the step of connecting the semiconductor chip to the tape by protruding electrodes and the step of filling an under-filling material between the semiconductor chip and the tape.--

Replace the paragraph beginning at page 8, line 19, with the following rewritten paragraph:

--Figure 3 illustrates a method of fabricating the semiconductor device 10 of Fig. 1. The basic process for fabricating the semiconductor device 10 is well known and will be described only briefly. The buffer sheet 18 is attached to the TAB tape 14, the die bonding material 20 is applied to the buffer sheet 18, and the semiconductor chip 12 is fixed to the TAB tape 14. The electrodes of the semiconductor chip 12 are connected to the bonding pads 22 of the TAB tape 14 by the wires 26. A transfer mold is carried out to seal the semiconductor chip 12 by the sealing resin 34. Then, the solder balls 28 are secured to the ball pads 24 of the TAB tape 14.--

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Replace the paragraph beginning at page 9, line 3, with the following rewritten paragraph:

--Figure 4 shows an example of surface-mounting the semiconductor device 10 to the motherboard 36. In this case, at least the solder balls 28 are heated to reflow, so that the solder balls 28 are fused to the electrode pads 38 of the motherboard 36. In the case where the semiconductor device 10 of surface-mounting type such as a BGA or CSP semiconductor device having the solder balls 28 as external terminals is mounted to the motherboard 36, in general, the semiconductor device 10 is heated in a reflow equipment having the [ambience] ambient temperature of about 250°C, to thereby connect the melted solder balls 28 to the electrode pads 38 of the motherboard 36.--

Replace the paragraph beginning at page 11, line 25, with the following rewritten paragraph:

--These samples (samples Nos. 1 to 3) according to the invention and the comparative [samples] sample 1 having no holes are maintained in an atmosphere of 85° in temperature and 85% in humidity for 24 hours and 48 hours, and the IR reflow is then conducted (at the reflow temperature of 250°C for about 10 seconds). Then, the bulging of the semiconductor devices (PKGs) is observed. As a result, as shown in Table 1, the samples of the semiconductor device having through holes do not exhibit [no] bulging even after being held for 48 hours in the test atmosphere, but all the samples of the semiconductor devices having no holes exhibit bulging after being held for only 24 hours in the test atmosphere.--

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IN THE CLAIMS:

Please amend Claim 14, as follows:

14. (Amended) A semiconductor device comprising a semiconductor chip, a tape for mounting said semiconductor chip thereto, an adhesive resin layer interposed between said semiconductor chip and said tape, and solder balls arranged on said tape, characterized in that said tape is made of a material having high water permeability sufficient to prevent cracking and bulging of said semiconductor device which might occur when the solder balls are reflowed after said semiconductor device absorbs moisture.